Remarks

Claims 1-11 remain in the application and claims 12-14 have been newly added.

The Abstract of the Disclosure has been amended to eliminate reference numbers and designations referring to claim elements as steps.

Claims 1-11 have been amended to eliminate reference numbers, to provide correct antecedent basis for all claim elements, to eliminate the term "preferably," to eliminate phrases and designations referring to claim elements as steps, and to eliminate multiple dependencies.

Newly added claims 12-14 have been added to expressly recite the features of claims 3, 5, and 6, respectively, previously referred to as exemplary or "preferable."

As such, claims 1-11 have been clarified by amendment for purposes of form. It is respectfully submitted that the amendments to claims 1-11 are neither narrowing nor made for substantial reasons related to patentability as defined by the Court of Appeals for the Federal Circuit (CAFC) in <u>Festo Corporation v. Shoketsu Kinzoku Kogyo Kabushiki Co., Ltd.</u>, 95-1066 (Fed. Cir. 2000). Therefore, the amendments to claims 1-11 do not create prosecution history estoppel and, as such, the doctrine of equivalents is available for all of the elements of claims 1-11.

Consideration and allowance of the application is respectfully requested.

Attached hereto is a marked up version of the changes made to the specification and claims by the current amendment. The attached page is captioned "Version With Markings to Show Changes Made."

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Respectfully submitted,

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Date

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

In The Abstract

Please amend the abstract as follows:

The present invention relates to determination of a property of an optical device under test, e.g. the group-delay of the optical device under test, by: [a)] tuning an optical frequency λ of an optical beam [(4)], [b)] deriving a dependency of the optical frequency λ of the optical beam [(4)] over a first time period t, [c)] deriving a dependency of the optical property of the device under test [(18)] over a second time period t+Δt, [d)] synchronizing the time dependency of the optical frequency λ of the optical beam [(4)] with the time dependency of the optical property of the device under test [(18)], and [e)] deriving the frequency dependency of the optical property of the device under test [(18)] from the synchronized time dependencies.

[[Fig. 1 for publication]]

In The Claims

Please amend the claims as follows:

1. (Amended) A method of determination of an optical property of an optical device under test [(18),] comprising [the steps of]:

splitting an incoming light beam [(4)] into a first initial light beam [(10)] and a second initial light beam [(12),];

splitting said first initial light beam [(10)] into a first light beam [(27)] and a second light beam [(26),];

coupling the first light beam [(27)] into the optical device under test [(18),];

letting the second light beam [(26)] travel a different path [as] from the first light beam [(27),];

superimposing the first [(27)] and the second light beam [(26)] to produce interference between the first light beam [(27)] and the second light beam [(26)] in a resulting first superimposed light beam [(46),];

detecting the power of the first superimposed light beam [(46)] for deriving a first signal over time containing information about the optical property of the device under test [(18)] when tuning [the] a frequency of the incoming light beam [(4)] over a given frequency range[,];

splitting the second initial light beam [(12) in] into a fifth light beam [(24)] and a sixth light beam [(25),];

superimposing the fifth [(24)] and the sixth light beam [(25)] after [each] the fifth and sixth light [beam (24, 25) has] beams have traveled a different path, to produce interference between the fifth [(24)] and the sixth light beam [(25)] in a resulting second superimposed light beam [(44),];

detecting the power of the resulting second superimposed light beam [(44)] for deriving a second signal over time containing information about [the] a time dependence of [the] a frequency when tuning [the] a frequency of the incoming light over a given frequency range[,];

compensating a time-delay between the first and the second signal[,]; and

deriving a frequency dependency of the first signal for deriving the optical property of the optical device under test [(18)].

2. (Amended) The method of claim 1, further comprising [the steps of]:

deriving elements of [the] a Jones matrix for the optical device under test [(18)] from the compensated frequency dependence of the detected powers.

3. (Amended) The method of [the claims 1 or 2] claim 1, further comprising at least one of [the following steps]:

using a first light beam [(27)] with defined polarization, detecting the power of the resulting first superimposed light beam [(46)] as a function of frequency and polarization, and deriving [the] a polarization mode dispersion of the device under test [(18)] from the information obtained through the measurement, preferably represented as Jones matrix elements of the device under test [(18),];

deriving [the] a chromatic dispersion of the device under test [(18)] from the Jones matrix elements of the device under test [(18),];

using [a] said first light beam [(27)] with defined polarization, detecting the power of the resulting first superimposed light beam [(46)] as a function of frequency and polarization, and deriving the principal states of polarization of the device under test [(18)] from the Jones matrix elements of the device under test [(18),];

using [a] said first light beam [(27)] with defined polarization, detecting the power of the resulting first superimposed light beam [(46)] as a function of frequency and polarization, and deriving the polarization dependent loss of the device under test [(18)] from the Jones matrix elements of the device under test [(18),];

using [a] said first light beam [(27)] with defined polarization, detecting the power of the resulting first superimposed light beam [(46)] as a function of frequency and polarization, and deriving the fast and slow group delays, associated with the fast and slow principal states of polarization of the device under test [(18)] from the Jones matrix elements of the device under test [(18),];

deriving the insertion loss of the device under test [(18)] from the Jones matrix elements of the device under test [(18),];

deriving [the] a transmissivity of reflectivity of the device under test [(2)] from the Jones matrix elements of the device under test [(2)], and[/or]

using a first light beam [(27)] with defined polarization, detecting the power of the resulting first superimposed light beam [(46)] as a function of optical frequency and polarization, and deriving higher-order polarization mode dispersion parameters[, such as the rate of change of the differential group delay with frequency,] from the Jones matrix elements of the device under test [(2)].

4. (Amended) The method of [any one of the claims 1 - 3] claim 1, further comprising [the steps of]:

choosing the time-delay to be $\frac{1}{2}.(\tau_2-\tau_1)+\tau_d$

τ_2 being the delay of the sixth light beam [(25)] relative to the fifth light beam [(24)], τ_1 being the delay of the first light beam [(27)] relative to the second light beam [(26)], $(\tau_2-\tau_1)$ being an internal delay, and τ_d being an external delay.

5. (Amended) A software program or product[, preferably stored on a data carrier,] for executing [the] a method [of one of the claims 1 to 4] when run on a data processing system [such as a computer], said method comprising:

splitting an incoming light beam into a first initial light beam and a second initial light beam;

splitting said first initial light beam into a first light beam and a second light beam;

coupling the first light beam into the optical device under test;

letting the second light beam travel a different path from the first light beam;

superimposing the first and the second light beam to produce interference between the first light beam and the second light beam in a resulting first superimposed light beam;

detecting the power of the first superimposed light beam for deriving a first signal over time containing information about the optical property of the device

under test when tuning a frequency of the incoming light beam over a given frequency range;

splitting the second initial light beam into a fifth light beam and a sixth light beam;

superimposing the fifth and the sixth light beam after the fifth and sixth light beams have traveled a different path, to produce interference between the fifth and the sixth light beam in a resulting second superimposed light beam;

detecting the power of the resulting second superimposed light beam for deriving a second signal over time containing information about a time dependence of a frequency when tuning a frequency of the incoming light over a given frequency range;

compensating a time-delay between the first and the second signal; and

deriving a frequency dependency of the first signal for deriving the optical property of the optical device under test.

6. (Amended) An apparatus for determination of a property of an optical device under test [(18), preferably a heterodyne optical network analyzer (1)], comprising:

a first beam splitter [(8)] in the path [(6)] of the incoming light beam [(4)] for splitting the incoming light beam [(4)] into a first initial light beam [(10)] traveling a first initial path and a second initial light beam [(12)] traveling a second initial path[,];

a second beam splitter [(22)] in the path of the first initial light beam [(10)] for splitting the first initial light beam [(10)] into a first light beam [(27)] traveling a first path and a second light beam [(26)] traveling a second path, wherein the optical device under test [(18)] can be coupled in said first path for coupling in the first light beam [(27),];

a third beam splitter [(22)] in said first and in said second path for superimposing the first [(27)] and the second light beam [(26)] after the second light beam [(26)] has traveled a different path as the first light beam [(27)] to produce interference between the first light beam [(27)] and the second light beam [(26)] in a resulting first superimposed light beam [(46)] traveling a first resulting path[,];

a first power detector [(56)] in said first resulting path for detecting the power of the resulting first superimposed light beam [(46)] traveling the first resulting path as a function of frequency when tuning the frequency of the incoming light beam [(4)] over a given frequency range[,];

a fourth beam splitter [(20)] in said second initial path for splitting the second initial light beam [(12)] in a fifth light beam [(24)] traveling a fifth path and a sixth light beam [(25)] traveling a sixth path[,];

a fifth beam splitter [(20)] in said fifth and said sixth path for superimposing the fifth [(24)] and the sixth light beam [(25)] after [each light beam (24, 25) has] said fifth and sixth light beams have traveled a different path, to produce interference between the fifth [(24)] and the sixth light beam [(25)] in a resulting second superimposed light beam [(44)] traveling a second resulting path[,];

a second power detector [(54)] in said second resulting path for detecting the power of the resulting second superimposed light beam [(44)] as a function of frequency when tuning the frequency of the incoming light beam [(4)] over a given frequency range[,];

whereby an output of the power detector [(54)] is connected with an evaluation unit for:

detecting a time dependence in a tuning gradient of the frequency when tuning the frequency of the incoming light beam [(4)] over the given frequency range,

using a time-delay for compensating an external and/or an internal time-delay, and

deriving the optical property of the optical device under test [(18)] from the compensated optical frequency dependencies of the detected powers.

7. (Amended) A method of determination of an optical property of an optical device under test [(18)], comprising [the steps of]:

[a)] tuning an optical frequency λ of an optical beam [(4),];

[b)] deriving a dependency of the optical frequency λ of the optical beam [(4)] over a first time period t[,];

[c)] deriving a dependency of the optical property of the device under test [(18)] over a second time period t+Δt[,];

[d)] synchronizing the time dependency of the optical frequency λ of the optical beam [(4)] with [the] a time dependency of the optical property of the device under test [(18),]; and

[e)] deriving the frequency dependency of the optical property of the device under test [(18)] from the synchronized time dependencies.

8. (Amended) The method of claim 7, wherein [steps b) and c)] deriving a dependency of the optical frequency λ and deriving a dependency of the optical property of the device under test are performed with the use of at least one interferometer.

9. (Amended) The method of [claims 7 or 8] claim 7, wherein [step d)] synchronizing the time dependency of the optical frequency λ of the optical beam with a time dependency of the optical property of the device under test is performed by using a time-delay to synchronize the time dependency of the optical frequency λ of the optical beam [(4)] with the time dependency of the optical property of the device under test [(18)].

10. (Amended) The method of [any one of the claims 7-9] claim 7, wherein the synchronization is dynamic or static.

11. (Amended) A method of determination of an optical property of an optical device under test [(18)], comprising [the steps of]:

tuning a frequency of an incoming light beam [(4)] over a given frequency range[,];

splitting the incoming light beam [(4)] into a first initial light beam [(10)] and a second initial light beam [(12),];

splitting said first initial light beam [(10)] into a first light beam [(27)] and a second light beam [(26),];

coupling the first light beam [(27)] into the optical device under test [(18),];

letting the second light beam [(26)] travel a different path [as] from the first light beam [(27),];

superimposing the first [(27)] and the second light beam [(26)] to produce interference between the first light beam [(27)] and the second light beam [(26)] in a resulting first superimposed light beam [(46),];

detecting the power of the first superimposed light beam [(46)] for deriving a first signal over time containing information about the optical property of the device under test [(18),];

splitting the second initial light beam [(12)] in a fifth light beam [(24)] and a sixth light beam [(25),];

superimposing the fifth [(24)] and the sixth light beam [(25)] after said fifth and sixth [each] light [beam (24, 25) has] beams have traveled a different path, to produce interference between the fifth [(24)] and the sixth light beam [(25)] in a resulting second superimposed light beam [(44),];

detecting the power of the resulting second superimposed light beam [(44)] for deriving a second signal over time containing information about the time dependence of the frequency[,];

compensating a time-delay between the first and the second signal[,]; and

deriving a frequency dependency of the first signal for deriving the optical property of the optical device under test [(18)].

Please add the following new claims:

12. (Newly added) The method of claim 3, wherein the higher-order polarization mode dispersion parameters include the rate of change of the differential group delay with frequency.

13. (Newly added) The method of claim 5, wherein the software program or product is stored on a data carrier.

14. (Newly added) The apparatus of claim 6, wherein the optical device under test is a heterodyne optical network analyzer.